KEEP

KEEPING EMULATION ENVIRONMENTS PORTABLE

INFuture 2011

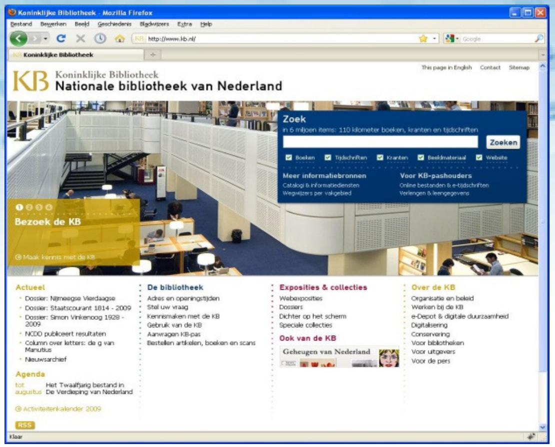
The KEEP Emulation Framework

Antonio Ciuffreda

University of Portsmouth

FUTURE-proof COMPUTING

SEVENTH FRAMEWORK PROGRAMME


Koninklijke Bibliotheek - Mozilla Firefox
Bestand Bewerken Beeld Geschiedenis Bladwijzers Extra Help
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Zoek
in 6 miljoen items: 110 kilometer boeken, kranten en tijdschriften
Zoeken
☑ Boeken ☑ Tijdschriften ☑ Kranten ☑ Beeldmateriaal ☑ Website

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Wegwijzers per vakgebied

Voor KB-pashouders
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Verlengen & leengegevens

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Maak kennis met de KB

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- NCDD publiceert resultaten
- Column over letters: de g van Manutius
- Nieuwsarchief

Agenda
tot augustus Het Twaalfjarig bestand in De Verdieping van Nederland

Activiteitenkalender 2009

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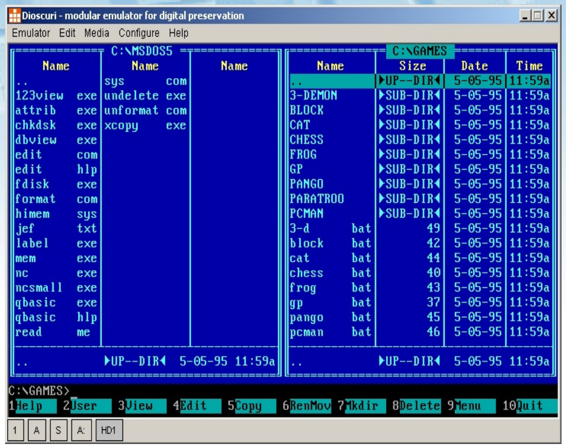
Bestellen artikelen, boeken en scans

Exposities & collecties
Webexposities
Dossiers
Dichter op het scherm
Speciale collecties

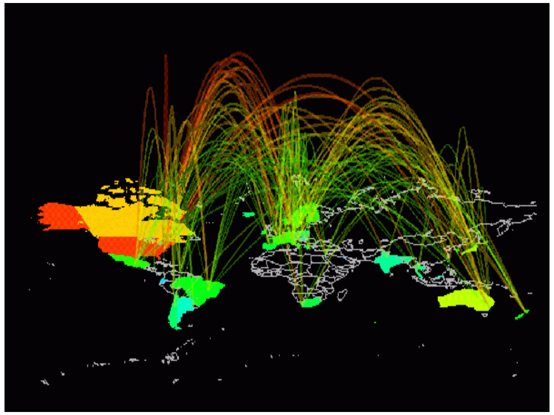
Ook van de KB
Geheugen van Nederland

Over de KB
Organisatie en beleid
Werken bij de KB
e-Depot & digitale duurzaamheid
Digitalisering
Conservering
Voor bibliotheken
Voor uitgevers
Voor de pers


Dioscuri - modular emulator for digital preservation
Emulator Edit Media Configure Help
1 A S A: HD1

```
============= C:\MSDOS5 ===============   ============== C:\GAMES ==============
    Name      |    Name      |   Name     |    Name     |  Size   |  Date   | Time
..            |sys       com |            |..           |▶UP--DIR◀| 5-05-95 |11:59a
123view   exe |undelete  exe |            |3-DEMON      |▶SUB-DIR◀| 5-05-95 |11:59a
attrib    exe |unformat  com |            |BLOCK        |▶SUB-DIR◀| 5-05-95 |11:59a
chkdsk    exe |xcopy     exe |            |CAT          |▶SUB-DIR◀| 5-05-95 |11:59a
dbview    exe |              |            |CHESS        |▶SUB-DIR◀| 5-05-95 |11:59a
edit      com |              |            |FROG         |▶SUB-DIR◀| 5-05-95 |11:59a
edit      hlp |              |            |GP           |▶SUB-DIR◀| 5-05-95 |11:59a
fdisk     exe |              |            |PANGO        |▶SUB-DIR◀| 5-05-95 |11:59a
format    com |              |            |PARATROO     |▶SUB-DIR◀| 5-05-95 |11:59a
himem     sys |              |            |PCMAN        |▶SUB-DIR◀| 5-05-95 |11:59a
jef       txt |              |            |3-d      bat |      49 | 5-05-95 |11:59a
label     exe |              |            |block    bat |      42 | 5-05-95 |11:59a
mem       exe |              |            |cat      bat |      44 | 5-05-95 |11:59a
nc        exe |              |            |chess    bat |      40 | 5-05-95 |11:59a
ncsmall   exe |              |            |frog     bat |      43 | 5-05-95 |11:59a
qbasic    exe |              |            |gp       bat |      37 | 5-05-95 |11:59a
qbasic    hlp |              |            |pango    bat |      45 | 5-05-95 |11:59a
read      me  |              |            |pcman    bat |      46 | 5-05-95 |11:59a
------------------------------------------------------------------------------------
..           ▶UP--DIR◀  5-05-95 11:59a    ..            ▶UP--DIR◀  5-05-95 11:59a
C:\GAMES>
1Help  2User  3View  4Edit  5Copy  6RenMov 7Mkdir 8Delete 9Menu  10Quit
```

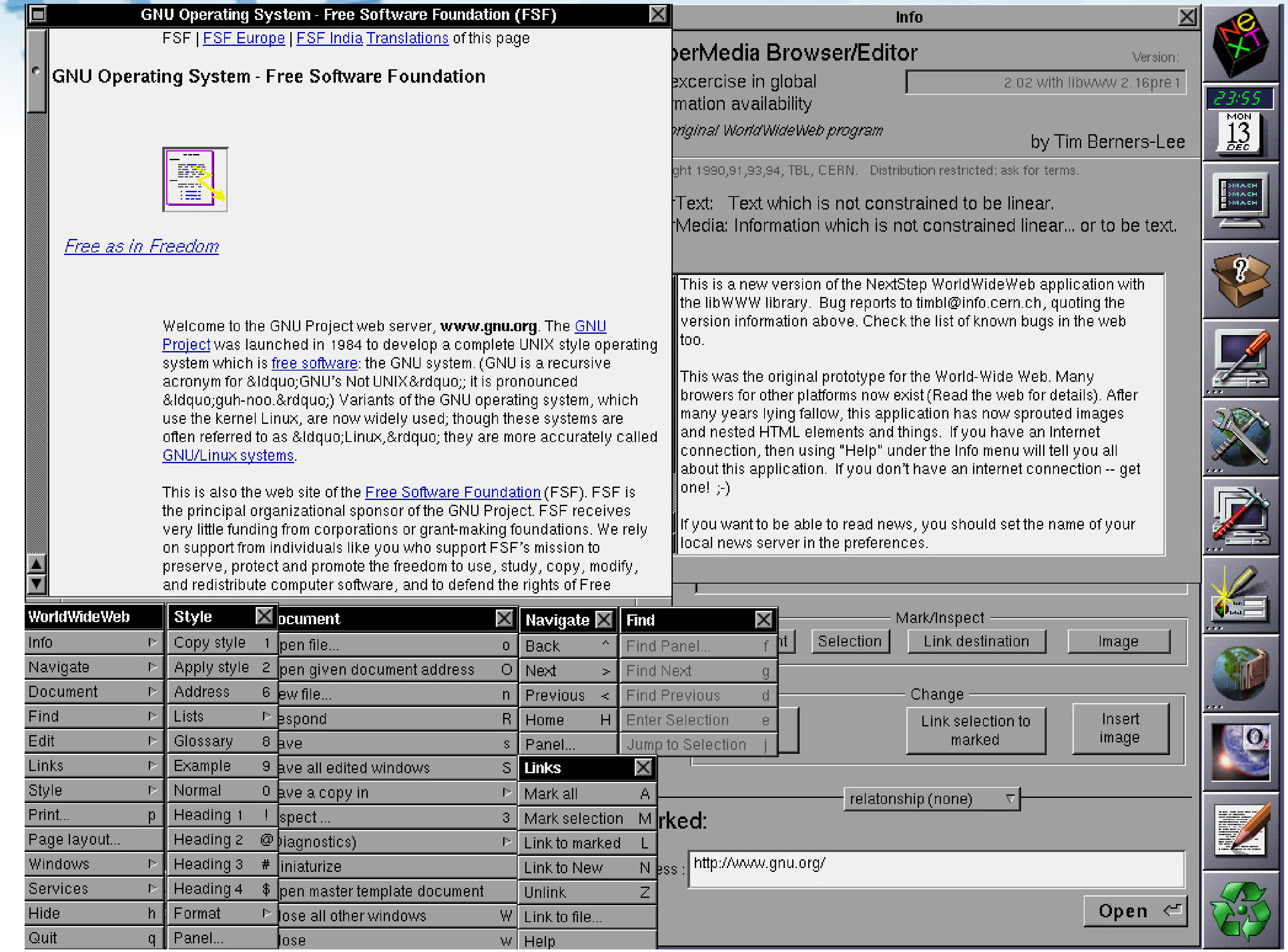
Digital collections need specialised solutions to be able to work with them.



An example:

Web archiving

WorldWideWeb browser - 1991



GNU Operating System - Free Software Foundation (FSF)

FSF | FSF Europe | FSF India Translations of this page

GNU Operating System - Free Software Foundation

Free as in Freedom

Welcome to the GNU Project web server, **www.gnu.org**. The GNU Project was launched in 1984 to develop a complete UNIX style operating system which is free software: the GNU system. (GNU is a recursive acronym for &ldquo;GNU's Not UNIX&rdquo;; it is pronounced &ldquo;guh-noo.&rdquo;) Variants of the GNU operating system, which use the kernel Linux, are now widely used; though these systems are often referred to as &ldquo;Linux,&rdquo; they are more accurately called GNU/Linux systems.

This is also the web site of the Free Software Foundation (FSF). FSF is the principal organizational sponsor of the GNU Project. FSF receives very little funding from corporations or grant-making foundations. We rely on support from individuals like you who support FSF's mission to preserve, protect and promote the freedom to use, study, copy, modify, and redistribute computer software, and to defend the rights of Free

Info

erMedia Browser/Editor

Version: 2.02 with libwww 2.16pre1

xcercise in global
mation availability

riginal WorldWideWeb program

by Tim Berners-Lee

ght 1990,91,93,94, TBL, CERN. Distribution restricted: ask for terms.

Text: Text which is not constrained to be linear.
Media: Information which is not constrained linear... or to be text.

This is a new version of the NextStep WorldWideWeb application with the libWWW library. Bug reports to timbl@info.cern.ch, quoting the version information above. Check the list of known bugs in the web too.

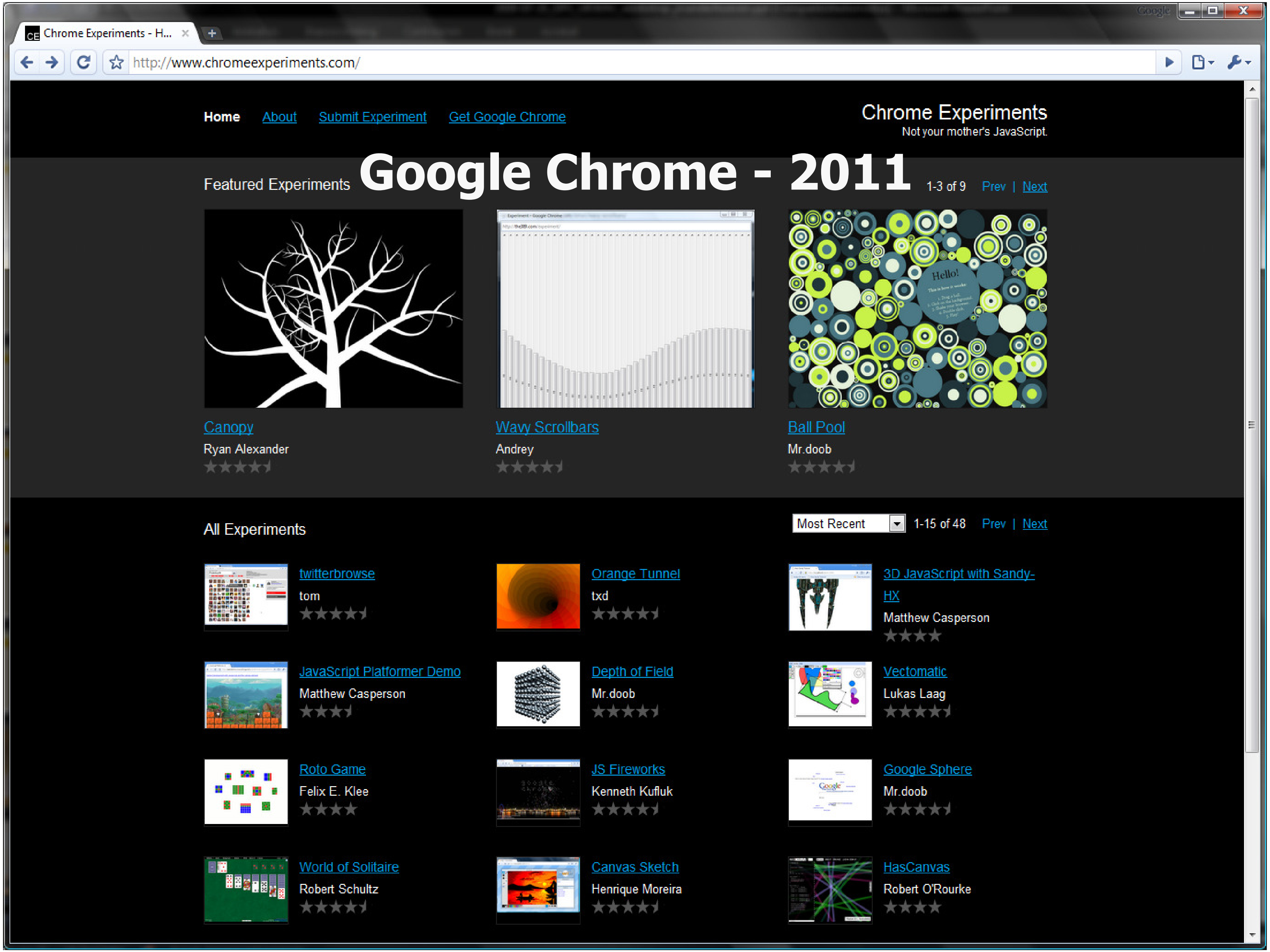
This was the original prototype for the World-Wide Web. Many browers for other platforms now exist (Read the web for details). After many years lying fallow, this application has now sprouted images and nested HTML elements and things. If you have an Internet connection, then using "Help" under the Info menu will tell you all about this application. If you don't have an internet connection -- get one! ;-)

If you want to be able to read news, you should set the name of your local news server in the preferences.

rked:

ess : http://www.gnu.org/

http://en.wikipedia.org



Google Chrome - 2011

Chrome Experiments - H...

http://www.chromeexperiments.com/

Home About Submit Experiment Get Google Chrome

Chrome Experiments
Not your mother's JavaScript.

Featured Experiments 1-3 of 9 Prev | Next

Canopy
Ryan Alexander

Wavy Scrollbars
Andrey

Ball Pool
Mr.doob

All Experiments Most Recent 1-15 of 48 Prev | Next

twitterbrowse
tom

Orange Tunnel
txd

3D JavaScript with Sandy-HX
Matthew Casperson

JavaScript Platformer Demo
Matthew Casperson

Depth of Field
Mr.doob

Vectomatic
Lukas Laag

Roto Game
Felix E. Klee

JS Fireworks
Kenneth Kufluk

Google Sphere
Mr.doob

World of Solitaire
Robert Schultz

Canvas Sketch
Henrique Moreira

HasCanvas
Robert O'Rourke

The way we use the web has changed significantly

- Static web sites
- News groups
- Offline working (history & caching
- Bookmarking

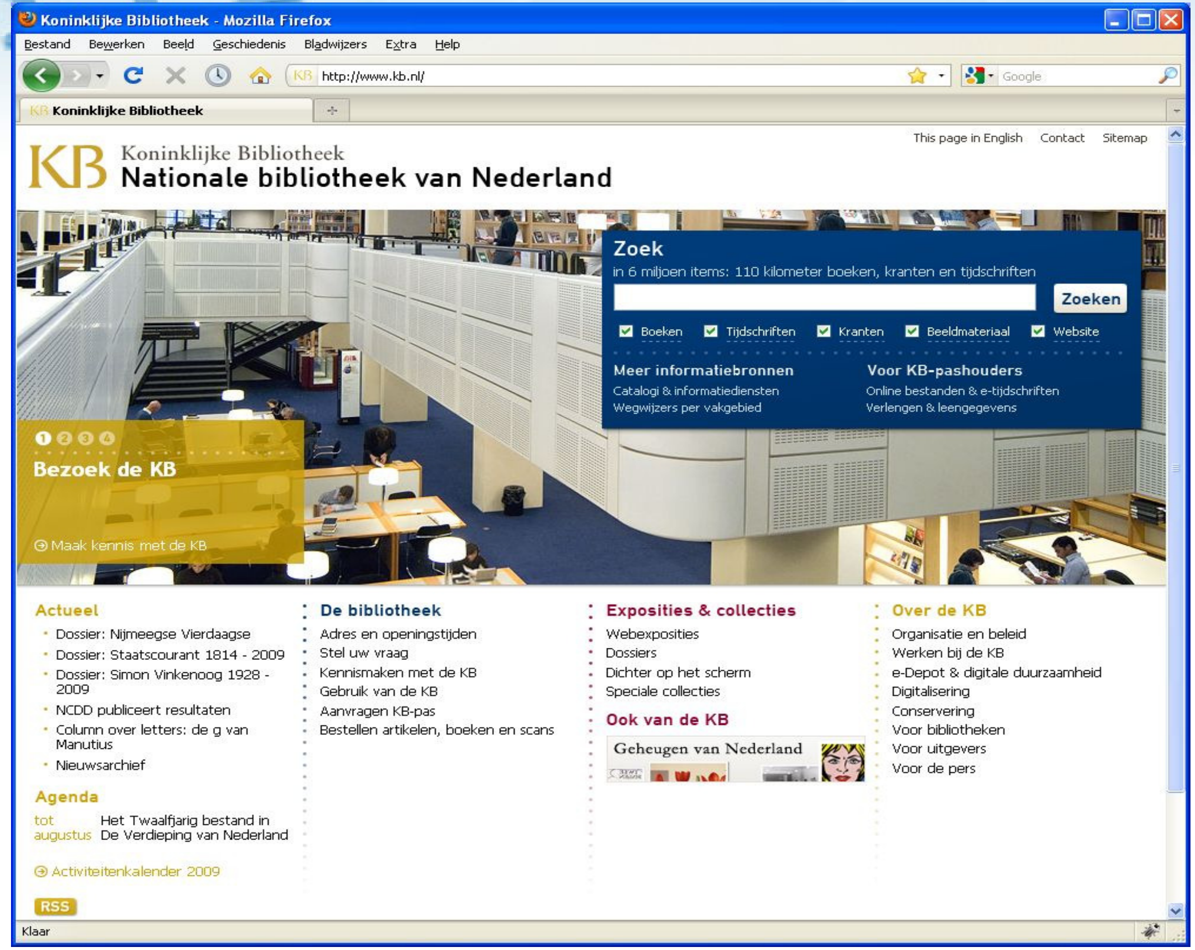
- Integration of media (text, sound, animations)
- Dynamic & personalised content
- Online collaboration
- Security & authentication
- Feeds (RSS, ATOM, etc.)
- SaaS (Software as a Service)

And so technology changed as well

- HTML
- Images and sound support
- A few plugins

- HTML, XHTML, CSS, XML, XSLT, SSL, …
- Java & Java Scripting, .NET
- RSS, RDF, ATOM, …
- Many plugins:
  - Audio & video codecs
  - Adobe PDF & Flash
  - ActiveX
  - Quicktime, …

Websites become inaccessible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Voor de pers

Computer A

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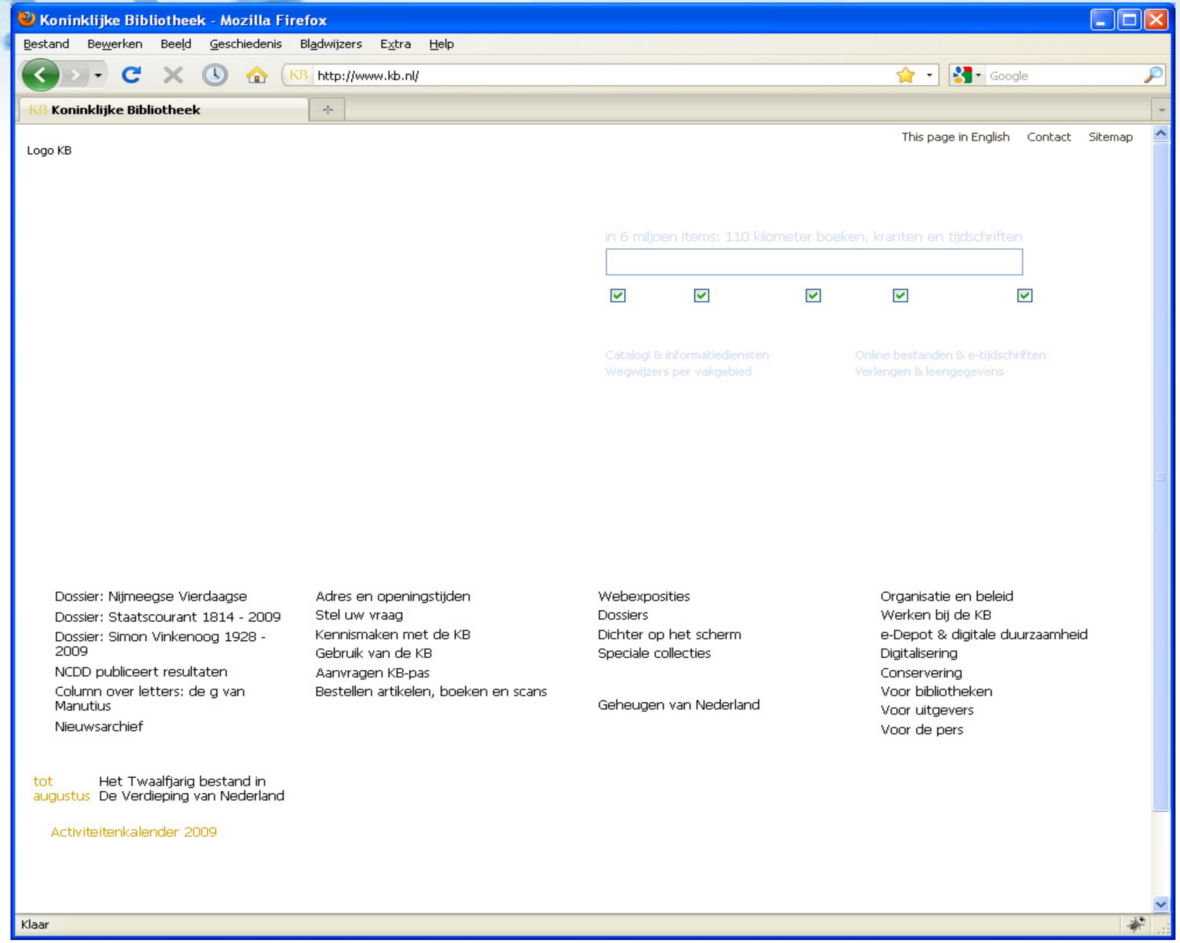

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Logo KB

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Computer B

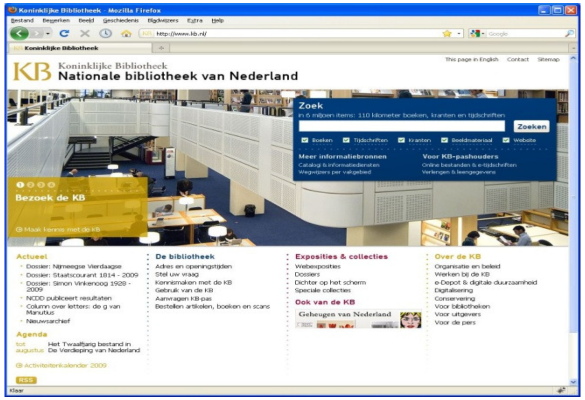
Approaches to long-term access: the basics

Approaches to access digital items

- Migration = convert the digital format
  - Applicable to text documents, images, videos. Less suitable for rare formats or applications for which no good conversion is possible.

- Emulation = adapt the computer environment
  - Applicable to all kinds of digital items, but requires a lot initial effort. Where migration can not be done, emulation sees fit.

How emulation works



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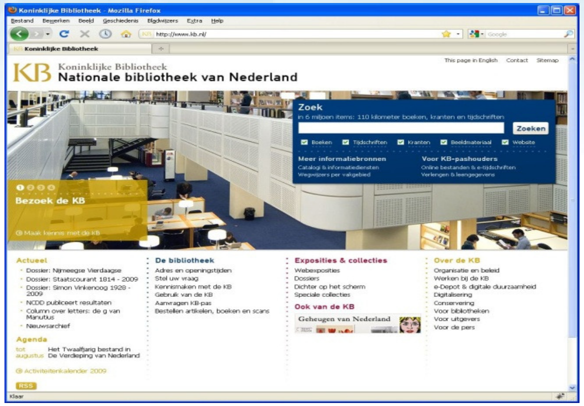
Voor de pers

Operating system
+
Fonts,codecs,plugins

Old computer



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Operating system
+
Fonts,codecs,plugins

emulator

Operating system

New computer

Many free & commercial emulation tools available!

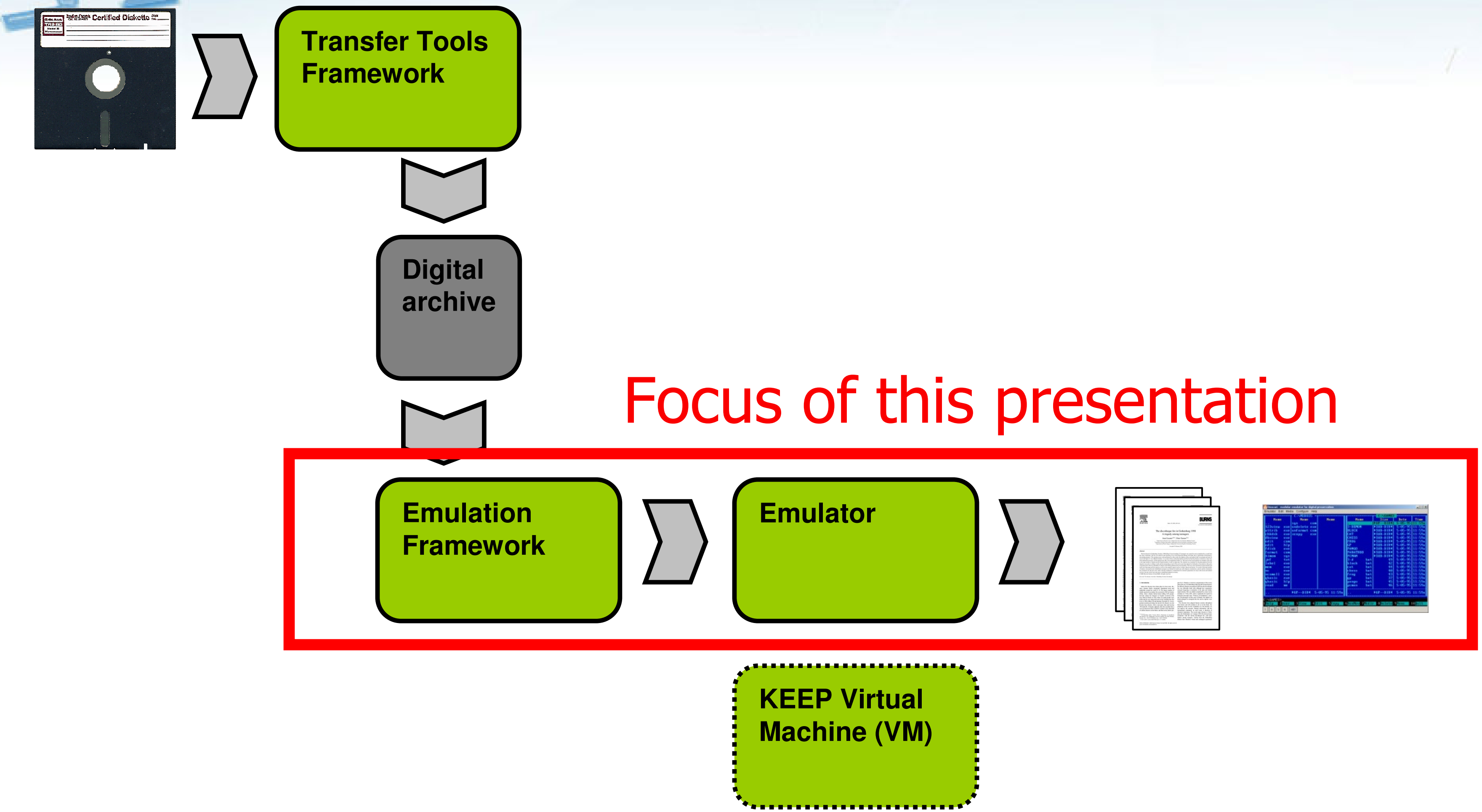
What we actually need to solve…

- Manage the tools and settings
- Automate setup of emulation process
- Get off data from obsolete data carriers
- Preserve original software
- Support users in operating old computer environments
- Preserve manuals, tutorials and other supporting documents

The KEEP approach:

solutions for the whole chain of digital preservation and access. From capturing raw data to experiencing its authentic value over time.

The KEEP approach



Transfer Tools Framework

Digital archive

Focus of this presentation

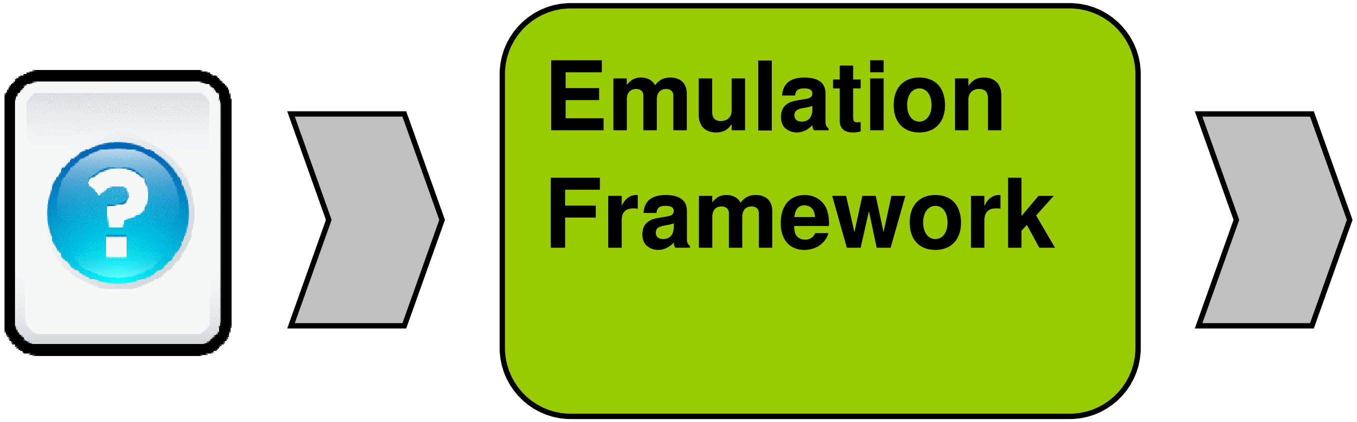
Emulation Framework

Emulator

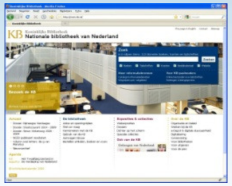
KEEP Virtual Machine (VM)

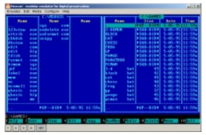
What is the KEEP Emulation Framework?

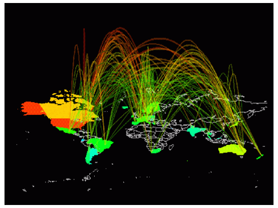
An integrated approach to long-term access for any digital object in its original context.



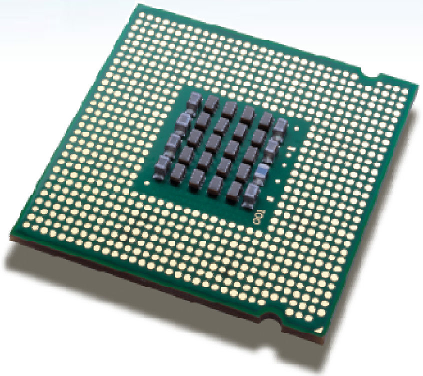
Emulation Framework







The EF supports:



6 platforms

x86, C64, Amiga, BBC Micro,

Amstrad, Thomson T07

7 emulators

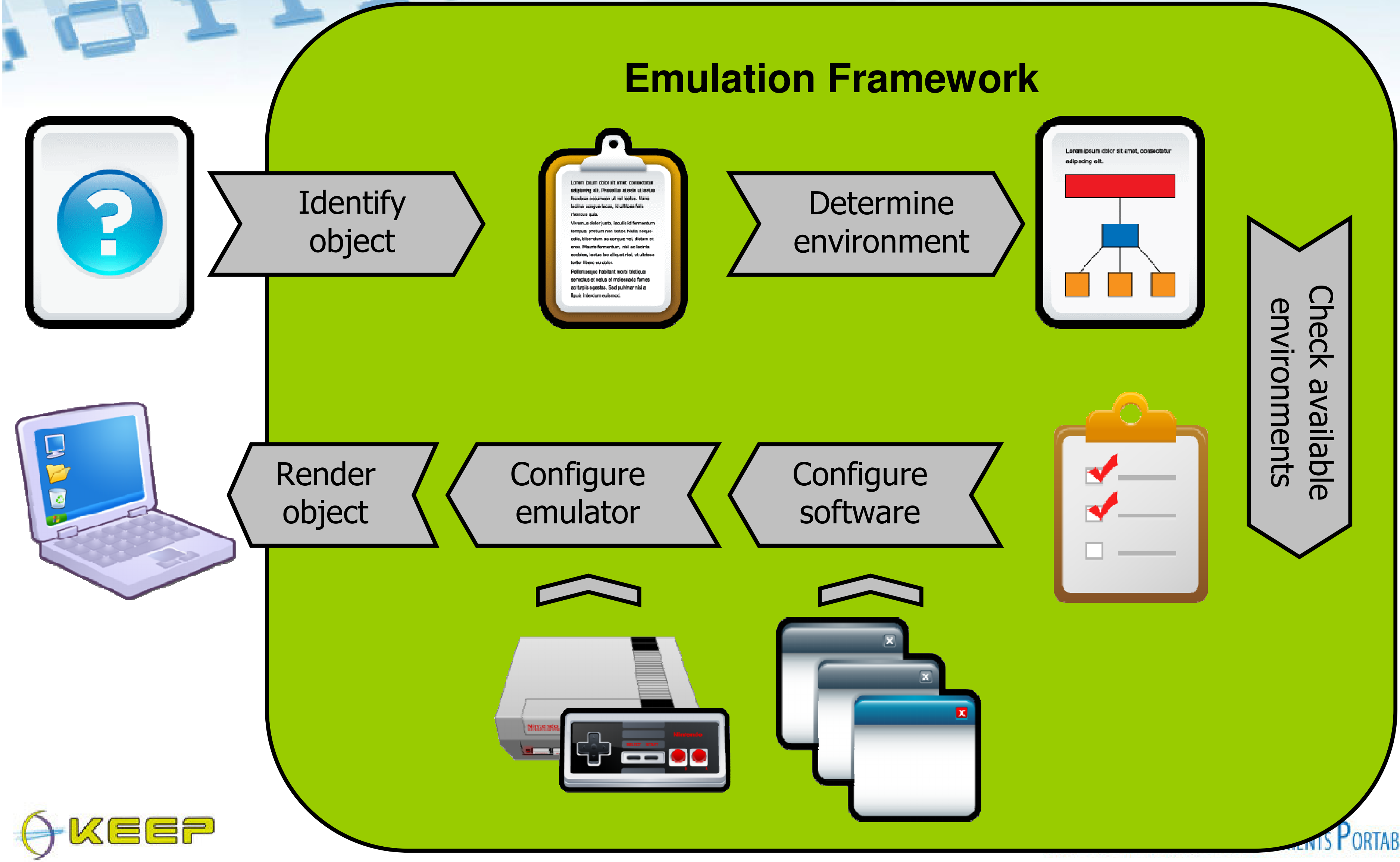
Dioscuri, Qemu, VICE, UAE,

BeebEm, JavaCPC, Thomson

25 file formats

e.g. PDF, TXT, XML, JPG, TIFF, PNG, BMP, Quark, ARJ, EXE, disk/tape images

Overall workflow EF



Emulation Framework

Identify object

Determine environment

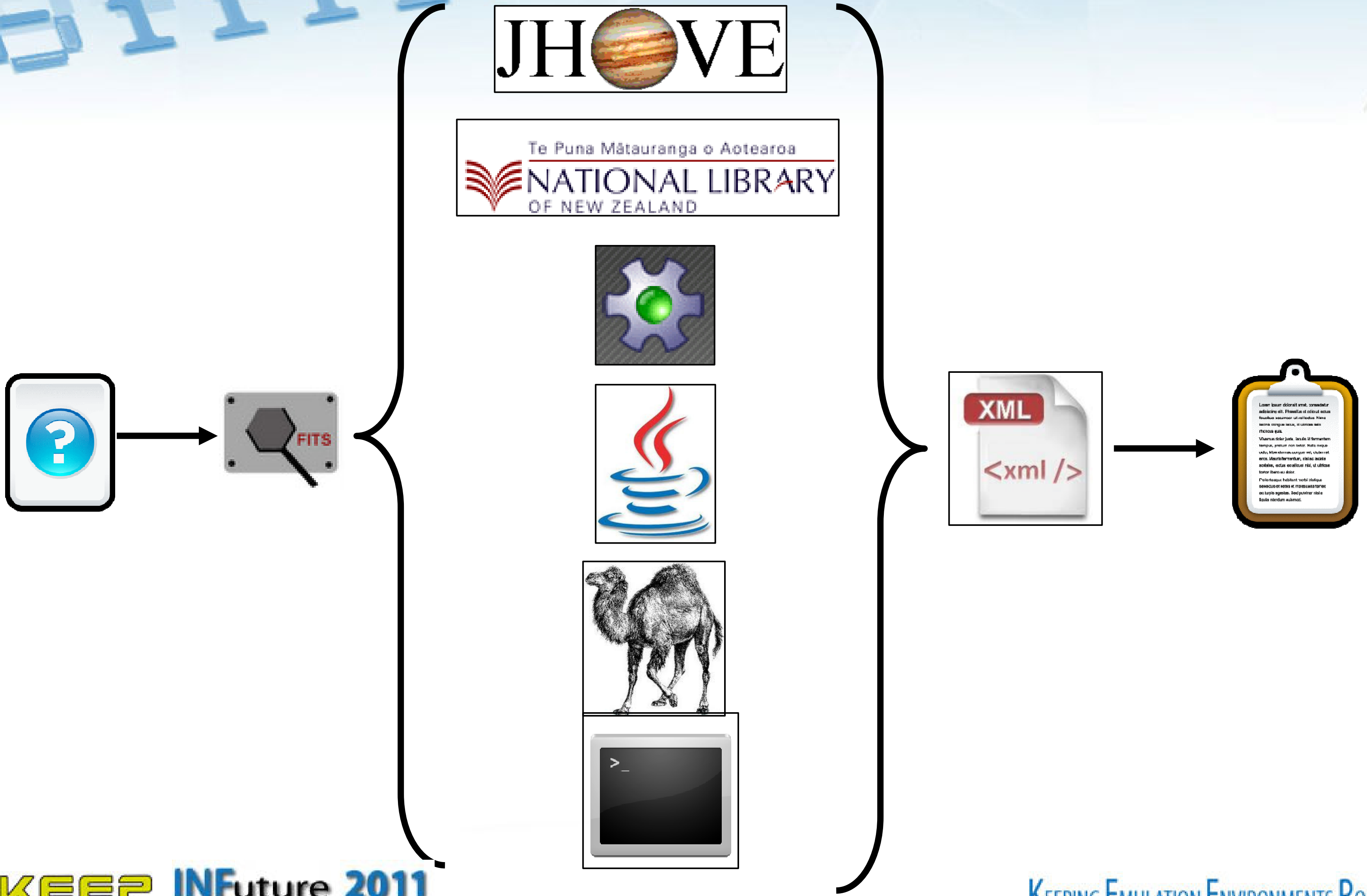
Check available environments

Configure software

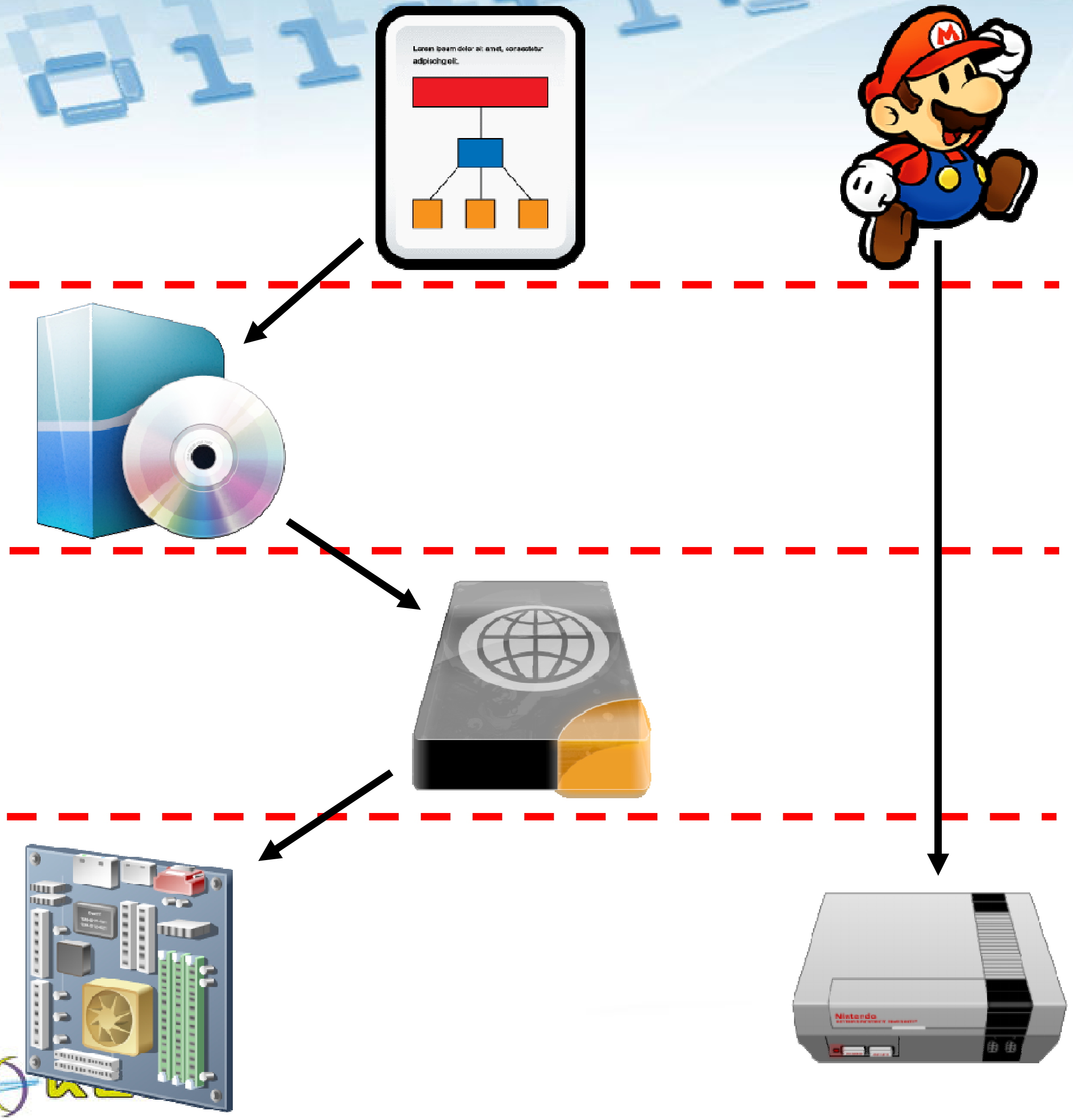
Configure emulator

Render object

Step 1: identification


FITS
JHOVE
Te Puna Mātauranga o Aotearoa
NATIONAL LIBRARY OF NEW ZEALAND
>_
XML
<xml />

Step 2: determine environment



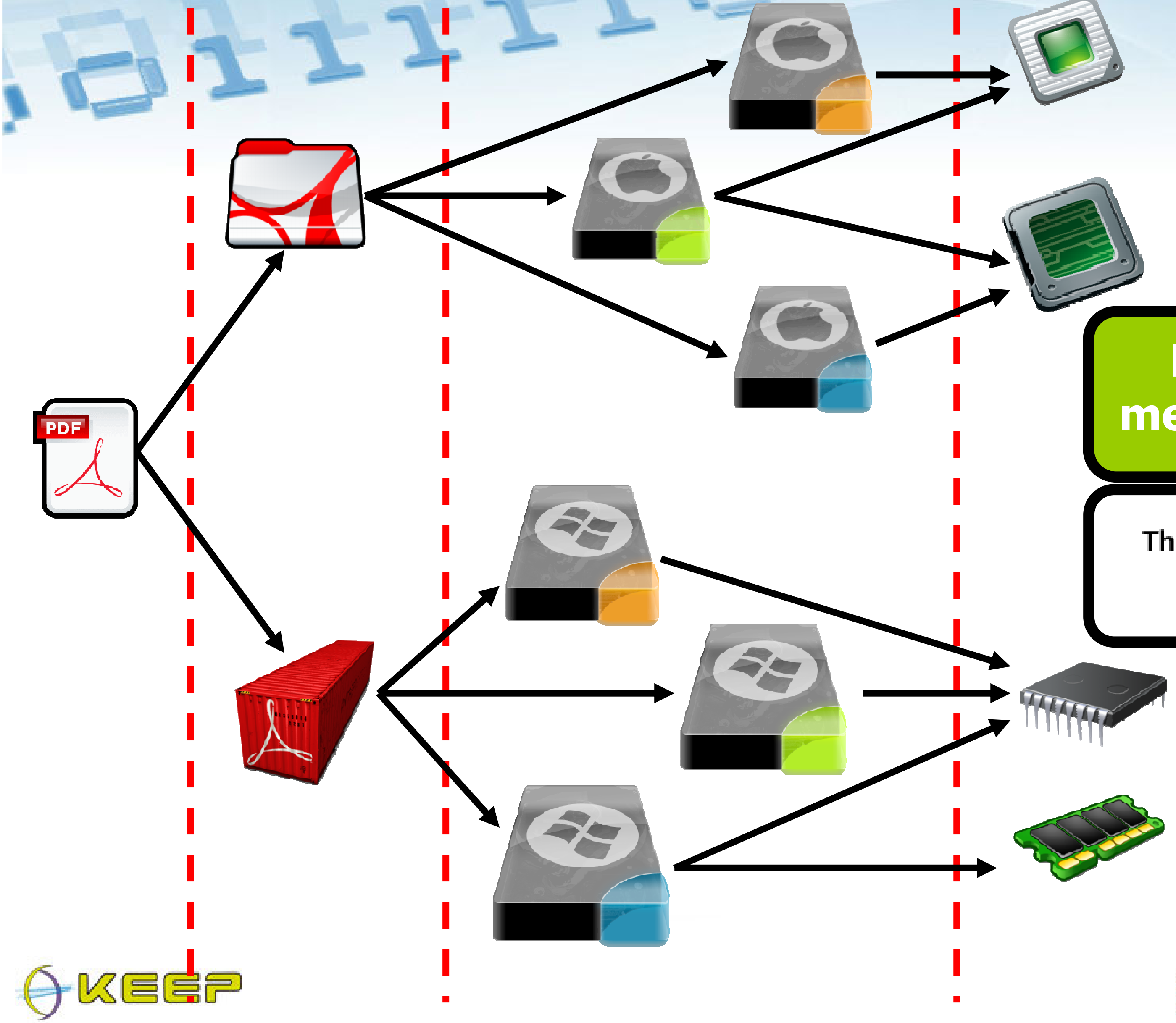
Digital object format

Rendering application

Operating system

Hardware platform

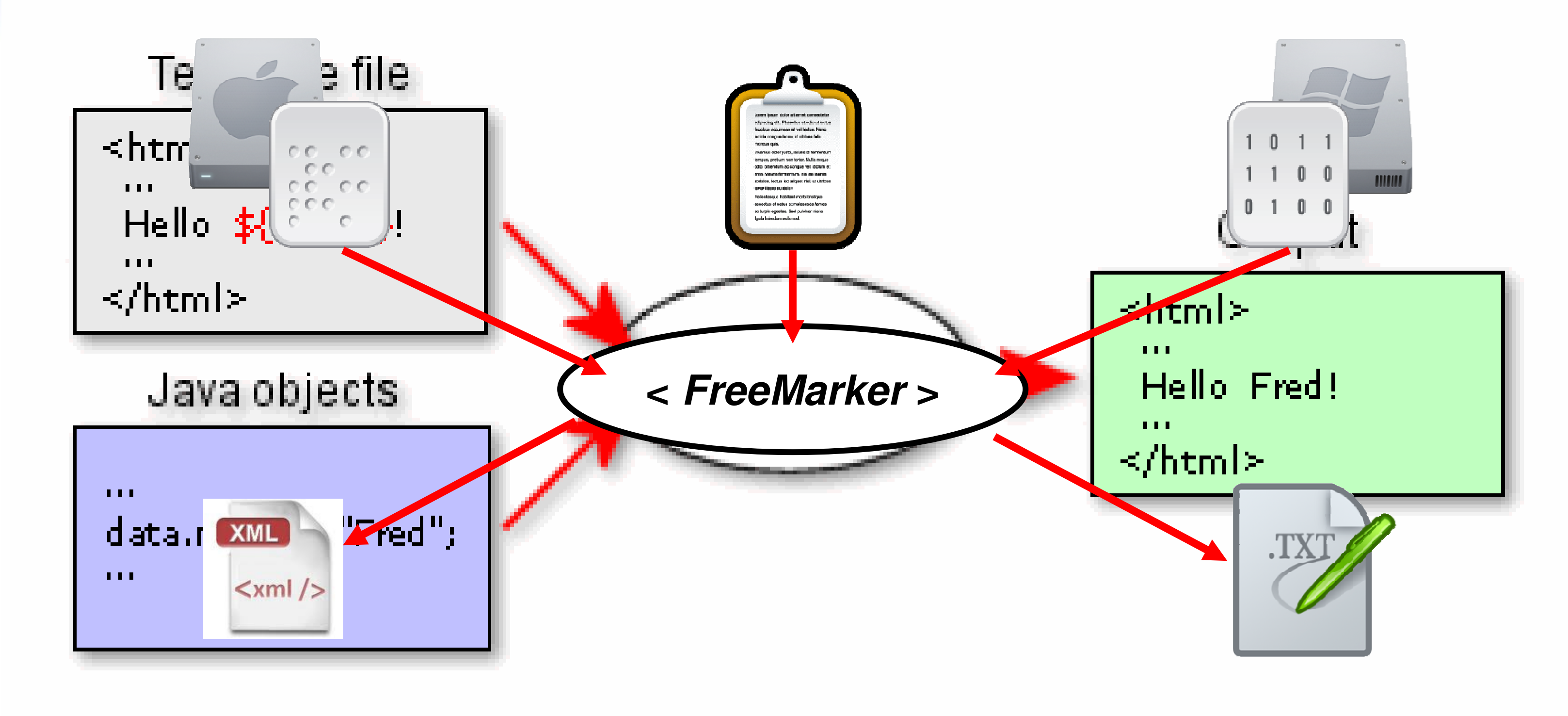
Step 3: construct an environment



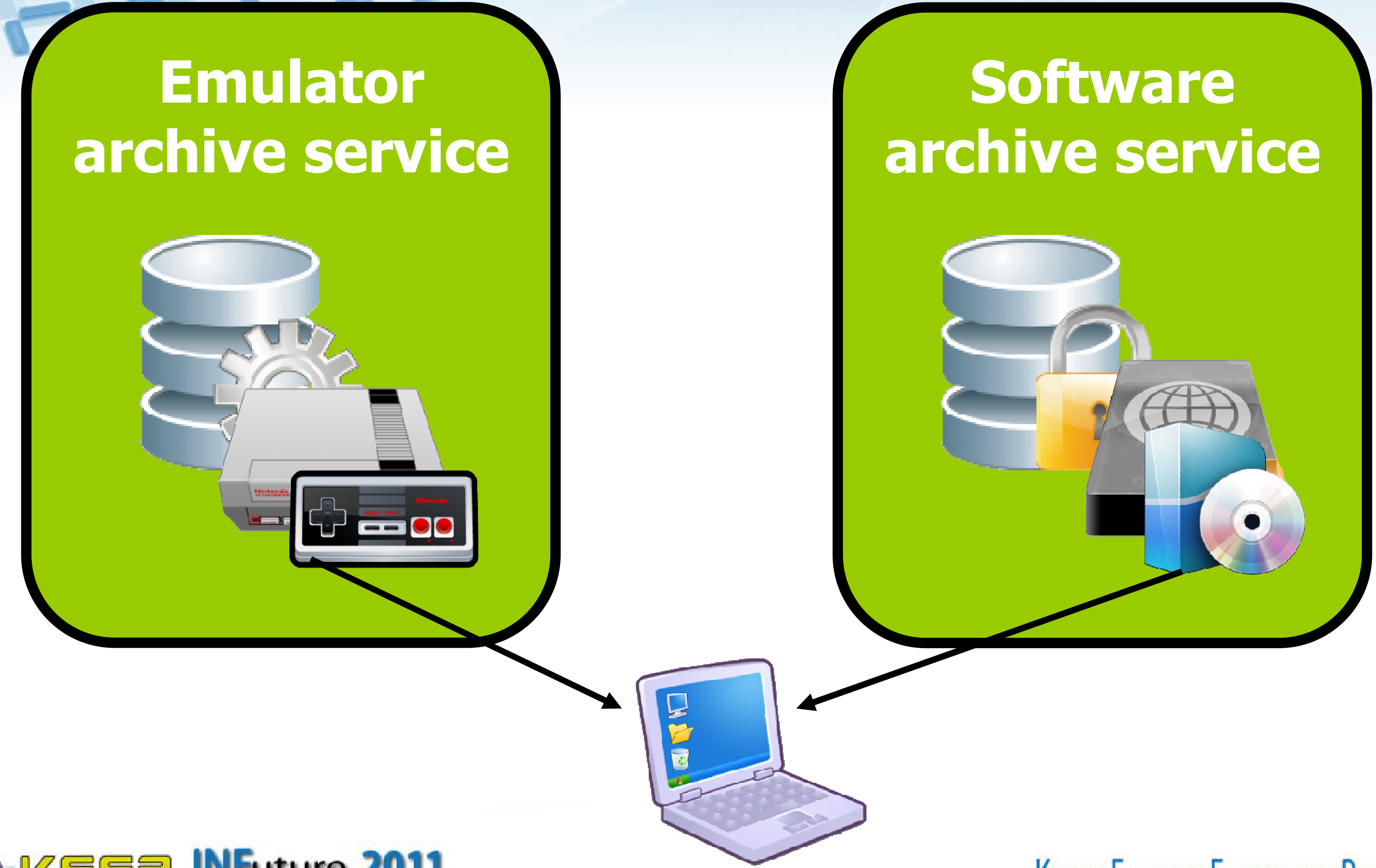
KEEP technical metadata database

The technical registry
PRONOM

Step 4: configure the emulator



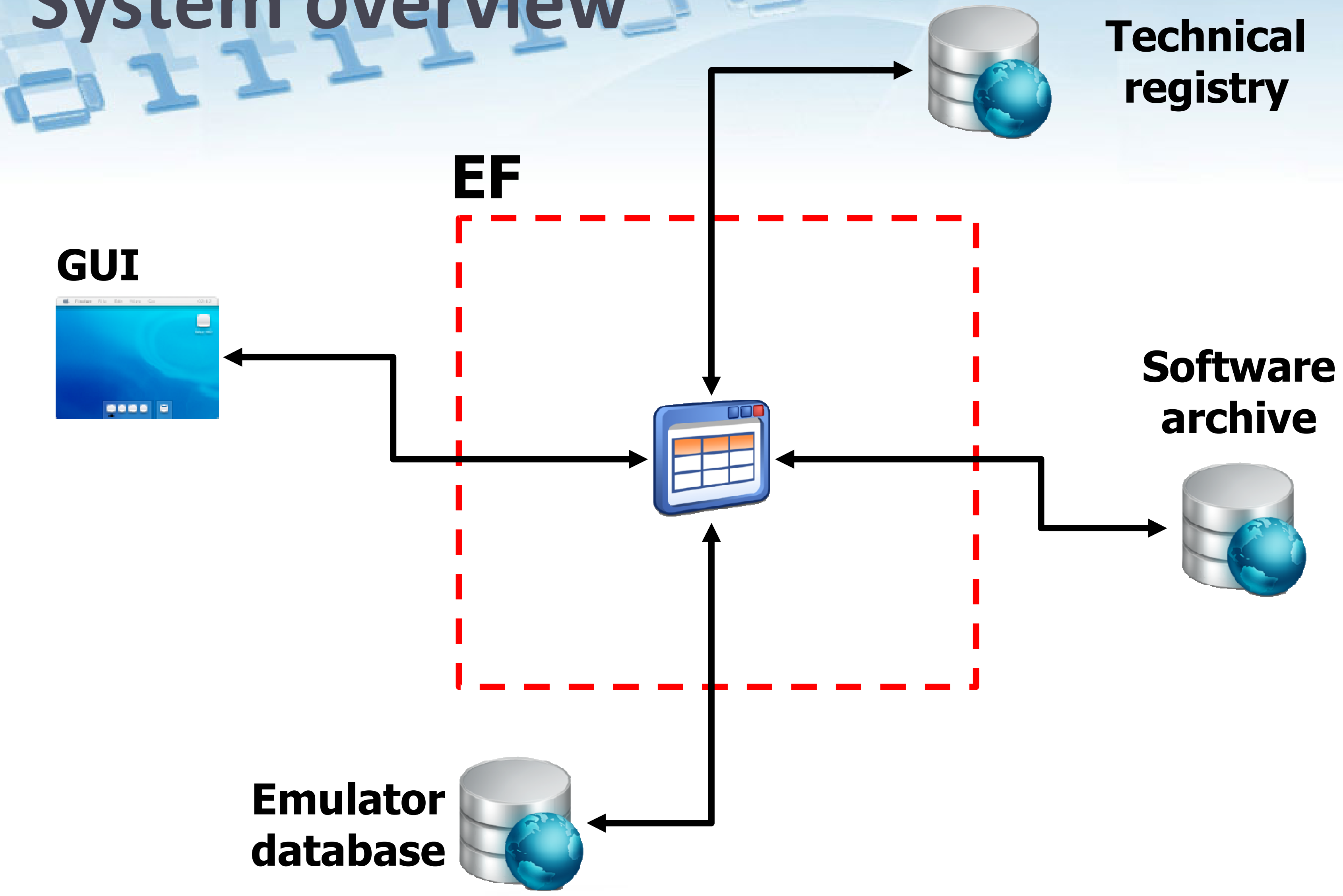
Emulator & software archives



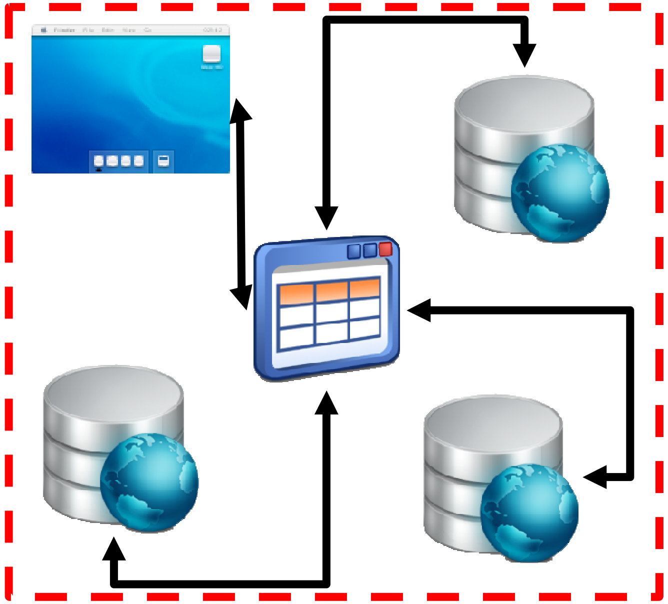
Emulator archive service

Software archive service

System overview



Demo



EF

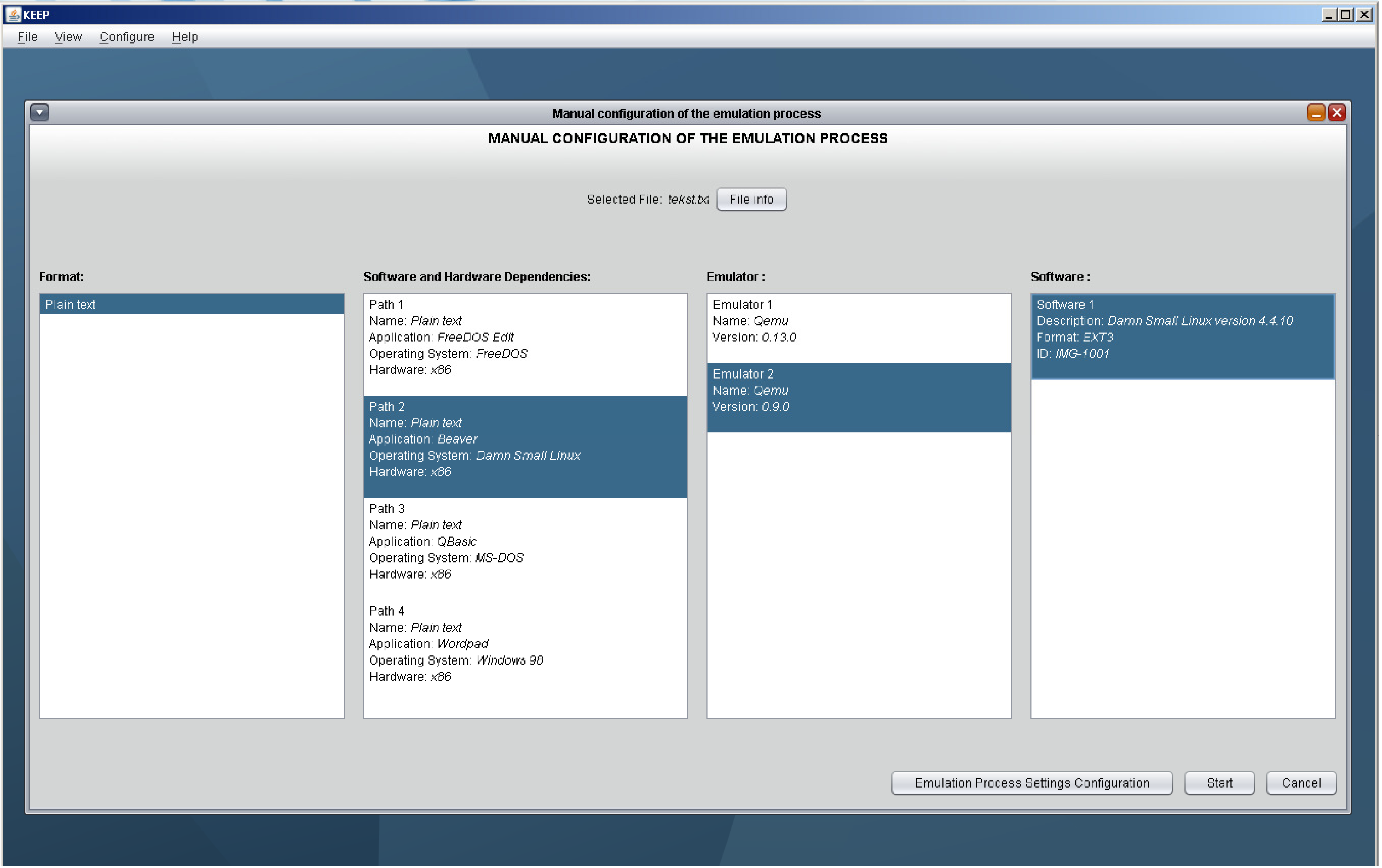
Technical registry

Test GUI

Software archive

Emulator archive

EF Graphical User Interface



MANUAL CONFIGURATION OF THE EMULATION PROCESS

Selected File: *tekst.txt*

Format:

Plain text

Software and Hardware Dependencies:

Path 1
Name: *Plain text*
Application: *FreeDOS Edit*
Operating System: *FreeDOS*
Hardware: *x86*

Path 2
Name: *Plain text*
Application: *Beaver*
Operating System: *Damn Small Linux*
Hardware: *x86*

Path 3
Name: *Plain text*
Application: *QBasic*
Operating System: *MS-DOS*
Hardware: *x86*

Path 4
Name: *Plain text*
Application: *Wordpad*
Operating System: *Windows 98*
Hardware: *x86*

Emulator :

Emulator 1
Name: *Qemu*
Version: *0.13.0*

Emulator 2
Name: *Qemu*
Version: *0.9.0*

Software :

Software 1
Description: *Damn Small Linux version 4.4.10*
Format: *EXT3*
ID: *IMG-1001*

In a nutshell: the EF can be applied to any digital collection.

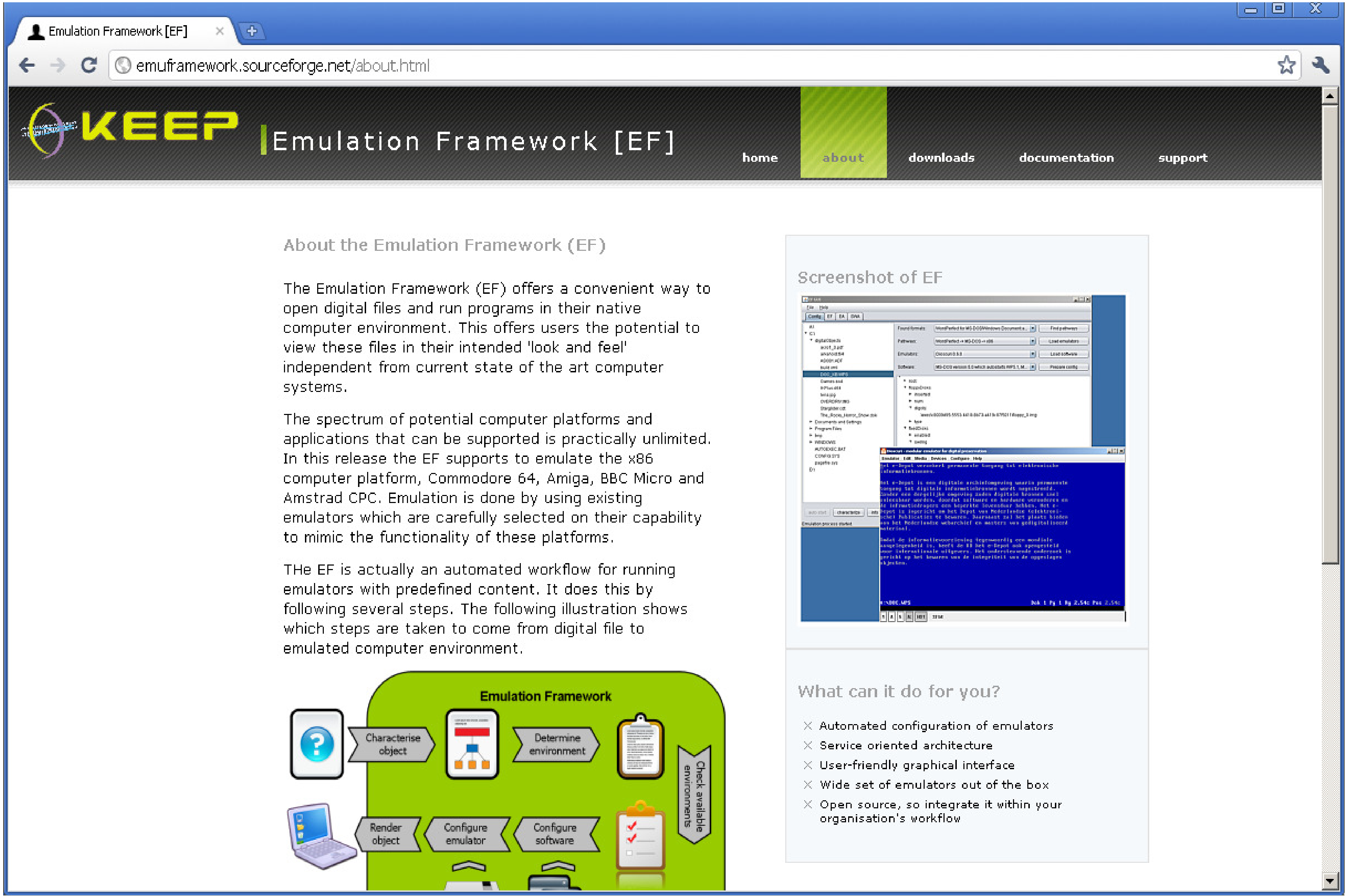
It leaves digital items as they are while taking away the pain to setup a rendering environment.

The EF offers you…

- …at least 6 computer platforms via emulation
- …access to at least 25 file formats
- …an organised way to store your software and emulators
- …support in operating the environment

EF Roadmap

- Aug – Oct 2011 : user tests & pilots
  - Dutch National Archives, CERN, NIMK, BnF, DNB, KB, Computerspiel museum
- November 2011 : release 1.1.0
  - Better support for managing software and emulator archives
  - New Graphical User Interface
- February 2012 : release 2.0.0
  - Incorporated user feedback



About the Emulation Framework (EF)

The Emulation Framework (EF) offers a convenient way to open digital files and run programs in their native computer environment. This offers users the potential to view these files in their intended 'look and feel' independent from current state of the art computer systems.

The spectrum of potential computer platforms and applications that can be supported is practically unlimited. In this release the EF supports to emulate the x86 computer platform, Commodore 64, Amiga, BBC Micro and Amstrad CPC. Emulation is done by using existing emulators which are carefully selected on their capability to mimic the functionality of these platforms.

THe EF is actually an automated workflow for running emulators with predefined content. It does this by following several steps. The following illustration shows which steps are taken to come from digital file to emulated computer environment.

Screenshot of EF

What can it do for you?

- Automated configuration of emulators
- Service oriented architecture
- User-friendly graphical interface
- Wide set of emulators out of the box
- Open source, so integrate it within your organisation's workflow

http://emuframework.sf.net

Thank you! Any questions?

Sourceforge EF website and forum:
http://emuframework.sf.net

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